

inspection of many types, will never do so, but they will eventually be properly studied and the absorbing and fundamental problems in the proper identification of our species will be settled.

Other historic factors in the proper study of taxonomy could be enumerated, for instance the very important work in tracing the exact routes of early explorers and collectors, such as is being so thoroughly prosecuted by Texan and other southwestern botanists. I must not, however, venture now into that large field, for I should soon tax your patience. The main points I have tried to emphasize are the historic and traditional background of plant taxonomy and plant-names; the dependence of exact taxonomy on the students and specimens of the past; the imperative need, if students in this field are to progress, of their having readily at hand the significant literature, dating back to 1700; and the need of still further studying the original specimens or types, from which our species have been described. This inevitable dependence on the work of the earlier botanists and their specimens is an intrinsic element in plant taxonomy; in the morphological and physiological fields the past and its literature are of relatively slight importance. If I have thus been able to make clear these fundamental differences of stress, I shall have done something to correct a misconception of taxonomy which in recent years has been too much fostered by those unfamiliar with its dependence on the past.

THE STATUS AND DISTRIBUTION OF SOME CYPERACEAE IN NORTH AND SOUTH AMERICA

HUGH O'NEILL

CYPERUS, SUBGENUS MARISCUS*

The name *Mariscus* in Pliny's *Historia Naturalis*¹ refers to a species of rush (*Juncus*). In 1742 Haller² used the word to describe a genus of plants which embraced a species subsequently called *Schoenus Mariscus* by Linné.³ Zinn⁴ defined the genus in

* [For a monographic treatment of *Mariscus* refer to Horvat, Sr. M. Liguori, A Revision of the Subgenus *Mariscus* Found in the United States. *Contr. Biol. Lab. Cath. Univ. America*. No. 33. 1941.]

¹ 21: 69. A. D. 77.

² *Enum. Helvetiae* 251.

³ *Sp. Pl.* ed. 1. 42.

⁴ *Cat. Pl. Hort. Gott.* 79.

1757 as including Haller's *Mariscus* and *Schoenus Mariscus* L. However, a year previously Patrick Browne⁵ published a West Indian species (of *Mariscus* Zinn) under the name *Cladium effusum*, thus introducing a new generic name. He failed to characterize this as a genus; however, Crantz⁶ described it in 1766. In 1788 the name *Mariscus* was used by Gaertner⁷ to designate a group of plants not related to *Cladium* but to *Cyperus*.

Since the *International Rules*⁸ validate a genus originally based on a single new species without a separate generic description, the name *Cladium* is recognized by reason of its priority and *Mariscus* Zinn becomes a synonym.

Gaertner's *Mariscus* was further restricted to mean the genus (or subgenus of *Cyperus* as now understood) by Vahl (1806).⁹ Since that time it has been treated as either a subgenus or a genus although the latter use is now invalidated since the name had already been used by Zinn for a group synonymous with *Cladium* before Gaertner took up the name. Fernald¹⁰ refers to it as "closely allied to and only unsatisfactorily separated from *Cyperus*." Robert Brown, Presl, Nees ab Esenbeck, Steudel, Clarke (i. e., in his later views) and Chermeson maintained it as a separate genus. Rottboell, Boeckeler, Bentham and Hooker, Suringar, Pax, Kükenthal and Fernald have preferred to leave it within the limits of *Cyperus*.

The three style-branches (stigmas) and trigonous achenes differentiate the subgenus *Mariscus* from 3 of its allied subgenera, i. e., *Juncellus*, *Pycreus*, and *Kyllinga*, all of which have two style-branches and lenticular achenes. The fact that the rhachilla does not break up into one-fruited joints distinguishes it from *Torulanium*, which subgenus exhibits that character in a marked degree. The decisive character that separates *Mariscus* from *Eucyperus* has been a much disputed point and still remains to be demonstrated.

Vahl¹¹ separated *Mariscus* from *Cyperus* only on the basis of its few-flowered ("subtriflorus") spikelets. In this respect he

⁵ Nat. Hist. Jamaica 114.

⁶ Inst. 362.

⁷ De fruct. 1: 12.

⁸ Art. 43.

⁹ Enum. Pl. 2: 372.

¹⁰ RHODORA. 25: 50. 1923.

¹¹ Op. cit. 372.

was followed by Robert Brown¹² who observed: "Habitus Cyperi, a quo differt solummodo spiculis paucifloris." It might be noted, however, that "paucifloris" meant for him "spicula 2-3-flora." Kunth,¹³ among others, pointed out the futility of attempting a separation based on that character: . . . "oft in derselben Art die Zahl der Blüthen variiren kann, so folgt hieraus natürlich, dass die Grenze zwischen jenen Gattungen eben so unbestimmt als willkürlich werden muss." Clarke¹⁴ confirmed Kunth's viewpoint: "The number of fertile flowers to the spikelet is of no use as a diagnostic character: in *Cyperus flavus* there are sometimes five or six nuts to the spikelet, though it is admittedly a typical *Mariscus*." Lestiboudois¹⁵ also maintained that there can be "spiculae multiflorae" in both *Cyperus* and *Mariscus*.

At one time Kunth tried to make the division between *Mariscus* and *Eucyperus* depend upon the fact that the achene in the former lay in a depression of the rhachilla ("in excavatione rhacheolae receptum"), surrounded by a well-developed and persistent wing. Later, he relegated that feature to the same category as that regarding the number of flowers¹⁶. "Der von mir früher (in *Nova gen. et species plant.* I. p. 212) der Gattung *Mariscus* beigelegte Charakter, wonach die Früchte in einer Vertiefung der *Rhacheola* liegen sollen, ist zwar vorhanden, findet sich aber gleichzeitig auch in mehreren Abtheilungen der Gattung *Cyperus*, nämlich in denen, welche ich *Papyri*, *glomerati*, *pennati* and *mariscoides* genannt habe."

Nees¹⁷ characterized *Mariscus* by the readily deciduous spikelets which disarticulate from the rhachis above the "squamis inferioribus" (i. e., the secondary prophyllum and bracteole): "Differt a Cypero spiculis a squamis inferioribus articulo solubilibus, rachi residua post lapsum spicularum quasi paleacea remanente."

Clarke¹⁸ accepted Nees's characterization and added an associated glume-character: "The subgenus of *Mariscus* includes

¹² *Prodromus* 218. 1810.

¹³ "Über die natürlichen Pflanzengruppen der Cyperaceen und Hypolytreen." *Physikal. Abh.* 8: 3.

¹⁴ "On the Indian Species of *Cyperus*." *Journ. Linn. Soc.* 21: 33. 1884.

¹⁵ *Essai sur la famille des cyperacées* 31. 1819.

¹⁶ *Op. cit.* 4.

¹⁷ "Synopsis generum Cyperacearum." *Linnaea* 9: 286. 1835.

¹⁸ *Op. cit.* 32, 33.

(for me) all those species . . . in which the glumes are permanent; or at all events do not fall from the spikelet before the spikelet has fallen from the rhachis . . . In all the numerous preceding species of *Pycreus*, *Juncellus* and *Eucyperus* the glumes fall from the rhachilla (while the rhachilla remains attached) by a clean-cut line separating the glume from its basal portion, which is decurrent down the rhachilla."

Another diagnostic point of *Mariscus* to which Clarke¹⁹ called attention is the presence of a papilliform disc on which the rhachilla is seated and from which it disarticulates leaving a smooth scar. He would have his meaning of "disc," which he thinks has differentiating value, distinguished from Boeckeler's meaning of the same term: "I hold that two very different things are included as discs by Boeckeler. In many species of *Cyperus* where the spikelet is at all oblique in its axis, in the dried state the rhachilla contracts very near the base *below* the lowest glume: here it seems to sit on a small cushion, but it is very firmly attached, and does not disarticulate at this point. This appearance (often only a result of drying) is not uncommon throughout the genus, as in *C. polystachyus*, where it is often prominent; and I estimate it as of no classificatory importance."

The persistence of glumes on a very readily deciduous rhachilla has been the distinguishing factor most widely used to separate the two subgenera. The condition of the papilliform disc has rarely been used. By means of the first character (persistence of glume) certain species are clearly referable to *Mariscus*.

<i>C. retrofractus</i>	<i>C. Nashii</i>	<i>C. Pringlei</i>
<i>C. hystericinus</i>	<i>C. globulosus</i>	<i>C. ligularis</i>
<i>C. dipsaciformis</i>	<i>C. flavus</i>	<i>C. thyrsiflorus</i>
<i>C. uniflorus</i>	<i>C. regiomontanus</i>	<i>C. lentiginosus</i>
<i>C. ovularis</i>	<i>C. Mutisii</i>	<i>C. refractus</i>
<i>C. retrorsus</i>	<i>C. asper</i>	<i>C. lancastriensis</i>
	<i>C. tetragonus</i>	

The following species, however, show characteristics both of *Mariscus* and *Eucyperus*; indeed, some of them show nearly all the characteristics of *Eucyperus*:

<i>C. Deamii</i>	<i>C. Martindalei</i>	<i>C. manimae</i>
<i>C. spectabilis</i>	<i>C. Houghtonii</i>	<i>C. cephalanthus</i>
<i>C. Schweinitzii</i>	<i>C. Wrightii</i>	<i>C. strigosus</i>
<i>C. Fendlerianus</i>	<i>C. Blodgettii</i>	<i>C. planifolius</i>
<i>C. filiculmis</i>	<i>C. Pollardi</i>	<i>C. Parishii</i>
<i>C. Grayii</i>	<i>C. fuliginous</i>	

¹⁹ *Ibid.* 154.

Readily deciduous glumes, disarticulating along a straight line from a more or less persistent rhachilla are conspicuously evident in all the species of the second list, particularly in those of the *Laxiglumi* section of Kükenthal. But almost equally as readily deciduous are the rhachillas, which disarticulate either with none, some or all glumes persistent. The proper classification of these species, therefore, has always puzzled botanists.

Kükenthal²⁰ considers disarticulation of the spikelet found in typical *Mariscus* an advance over the more primitive type of non-disarticulating spikelet found in true *Eucyperus*. Species formerly regarded as *Eucyperus* by most botanists but showing even in a slight degree disarticulation of the spikelet are considered by him to be undergoing a stage of transition, approaching *Mariscus*; and he has placed them in that category, although they still show many characters of *Eucyperus*.

Apparently, there is not a single reliable character or set of characters available by which these two subgenera can be sharply distinguished from each other. Detailed histological and cytological studies along with genetic and ecological research may in the future yield more satisfactory results. It therefore seems ill-advised to maintain *Mariscus* as a genus when it is a very ill-defined even as a subgenus.

IS SECTION ARISTATI PROPERLY PLACED IN MARISCUS?

THE STATUS OF CYPERUS GRANITOPHILUS McVAUGH

In *Castanea* 2: 100–104. 1937, McVaugh described a plant which he considered a new species and which he thought closely related to *C. inflexus* Muhl. (i. e., *C. aristatus* Rottb. in this treatment). The following key shows additional features which may be used to distinguish McVaugh's plant:

- Spikelets in dense hemispheric heads; culms rigidly erect; glumes 1.0–2.0 mm. wide, widened at about the middle, 9–13-nerved; achene 0.5–0.8 mm. wide, cuneate-obovoid; stamens commonly 1 or 2 on the same plant; anthers 1.0 mm. long; filaments 2.5 mm. long; rhachilla 0.4–0.8 mm. wide. Apparently confined to soil resulting from the weathering of granite, from Georgia to North Carolina..... *C. granitophilus* McVaugh.
- Spikelets digitate in dense or loose heads; culms more or less flaccid; glumes 0.5–1.0 mm. wide, scarcely widened below the middle, 7–9-(very rarely 5 or 11) nerved; achene 0.3–0.5 mm. wide, oblong to oblong-obovoid; stamens 1 (very rarely 2); anthers 0.3–0.4 mm. long; filaments 1.5 mm. long; rhachilla 0.2–0.6 mm. wide..... *C. aristatus* Rottb.

²⁰ Engler, *Pflanzenr.* 4²⁰: 35. 1935.

The following are the only specimens of *C. granitophilus* found among 600 sheets of *C. aristatus* (i. e., *C. inflexus*):

ALABAMA: Randolph County, *McVaugh* 5213. GEORGIA: Columbia County, *McVaugh* 5144; *Pyron and Duncan* 86; De Kalb County, *Biltmore Herbarium* 5062b (cotype); *Correll* 8380; *Pollard and Maxon* 500; *Small* in 1894; Greene County, *McVaugh* 5326; Hancock County, *McVaugh* 5362; Heard County, *McVaugh* 5181; Oglethorpe County, *McVaugh* 5370; Walton County, *Pyron and McVaugh* 971 (type). NORTH CAROLINA: Henderson County, *McVaugh* 5410; Forsyth County, *Wherry and Pennell* 14335; Rowan County, *Biltmore Herbarium* 5062a; Franklin County, *H. J. Oosting* 1824. SOUTH CAROLINA: Kershaw County, *McVaugh* 5129.

All these specimens were collected on certain granitic outcrops in the above-mentioned counties although specimens collected on other granitic outcrops were *C. aristatus*. Apparently, the species is confined to primary soils resulting from the decomposition of granite. In fact, angular fragments of quartz and black plates of biotite are intermixed with the roots of the isotype specimen (*Pyron and McVaugh* 971).

According to T. H. Watson (Bull. Geol. Sur. Ga. 9-A, 60-65, 1902 and U. S. Geol. Surv., Granites of the Southeastern Atlantic States 426: 233. 1910) "the light gray granite of Stone Mountain is strongly contrasted with all other types of granite in Georgia. It differs from them in mineral composition in the large preponderance of muscovite over biotite, which though invariably present, occurs in very small quantity." This difference in mineral composition does not obviously explain why the species seems to be confined to this type of granite. Perhaps the presence of accessory apatite is more significant. All the Georgia granites contain plagioclase in considerable amounts, so that the concurrence of large amounts of calcium and potassium in the resultant soil cannot be used to explain the range of *C. granitophilus*.

The best position for *C. granitophilus*, *C. hamulosus* and *C. aristatus* (including *C. inflexus*) appears to be in *Eucyperus*. In *C. granitophilus* the glumes are decidedly more readily deciduous than the rachilla; in *C. aristatus* (from North America) the glumes are very nearly as readily deciduous. This is also the case with twenty sheets of *C. aristatus* from the Old World (e. g. *Kotschy* 50, Nubia, in the Gray Herbarium with no rachillas shed and about fifty glumes gone) and specimens of *C. hamulosus*

(e. g., Herbarium De Candolle 129). This latter species is quite exceptional in the genus in that the glumes are not strictly 2-ranked. This arrangement and the constantly 5-nerved glumes are the only distinctions between it and *C. aristatus*. *C. aristatus*, *C. granitophilus* and *C. hamulosus* all have a solitary stamen (rarely 2), an annual habit, an identical peculiar odor, oblong anthers, and very prominent venation of the glumes. In striking contrast all the *Marisci* in the United States (and nearly all those of the rest of the world) have 3 stamens, are perennials, have no such odor, have linear anthers and glumes with relatively weaker venation. Clearly the *Aristati* do not belong in *Mariscus*. Not only the superficial resemblances of *Aristati* place them, as pointed out by Kükenthal (Engler, *Das Pflanzenreich* 4²⁰: 505. Note 1936) with the section *Amabiles* in *Eucyperus*, but in my opinion also their fundamental characters (Kükenthal takes the opposite view with respect to these last). However, section *Amabiles* (and section *Compressi*), although resembling the *Aristati*, differ from the latter in having the rhachillas very long-persistent and obscurely, if at all, jointed to the rhachis.

Further, the relatively deciduous character of rhachilla and glumes or the persistence and non-persistence of bracteole and prophyllum (often called lower scales) is quite unreliable as a means of determining the relationship of species of *Cyperus*. Equally unreliable as a criterion for the separation of the subgenera *Eucyperus* and *Mariscus* is the method of disjointing glumes and rhachillas, i. e., whether the disarticulation is along a straight or a jagged line. In proof of this the following may be cited:

In *C. compressus* the rhachillas appear to be not at all jointed to the rhachis and only after all the glumes have fallen do they disarticulate along a jagged line above the base. The bracteole and prophyllum are more or less readily deciduous. *C. cuspidatus* behaves similarly.

In *C. erythrorhizos* the rhachillas disarticulate nearly as readily as the glumes leaving a knob persistent on the rhachis exactly as in *Mariscus*. Again, the prophyllum and bracteole behave as in *C. compressus*.

In *C. rotundus* the glumes are very long-persistent; in fact, the author was unable to find any herbarium sheets where rhachillas, bracteole or glumes had fallen naturally.

C. esculentus has long-awned bracteoles subtending at least the lower spikelets similar to those in *C. flavus*. These as well as the glumes are very long-persistent. Only a few herbarium specimens showed rhachillas deciduous and none at all showed glumes deciduous. Where the rhachillas have fallen the bracteoles are usually persistent and there is usually a disc or knob with a smooth scar exactly similar to that shown in the *Marisci*.

In *C. Iria* the glumes are readily deciduous along a straight line while the rhachillas are long-persistent but finally deciduous leaving a smooth or rough-edged scar above the persistent bracteole and prophyllum.

In *C. pseudovegetus* the glumes are readily deciduous along a straight line; the rhachillas as well as bracteoles are long persistent.

All the foregoing species are universally considered members of *Eucyperus* and yet, their characteristics are frequently those assigned to *Mariscus*. On the other hand, in *C. filiculmis* (placed by Kükenthal in *Mariscus*) the glumes soon disjoint along a straight line; the rhachillas disarticulate with about the same ease and at about the same age as the glumes leaving a smooth disc-like scar but without persistent bracteoles and prophylla. In a specimen of *C. strigosus* (*J. B. S. Norton* 1116, Maryland), the majority of the rhachillas have fallen, but a considerable portion, perhaps 10%, of the rhachillas are still persistent and most of the glumes have fallen from these persistent rhachillas. By contrast, in another specimen of *C. strigosus* (*J. B. S. Norton* 1117, Maryland) about half the spikelets have fallen but no glumes have fallen from any of the spikelets that still persist on the rhachis. Even the fallen spikelets still retain all the glumes! In *John M. Fogg* 3251 from Barnstable Co., Mass. and *True* 2862 from Morris Co., N. J., both *C. strigosus*, most of the rhachillas are persistent while nearly all the glumes have fallen!

C. planifolius L. C. Rich. (= *C. Ottonis* Boeck. = *C. brunneus* Sw.), commonly accepted as one of the *Marisci*, always has rhachillas persisting long after the glumes have fallen!

C. aristatus, *C. granitophilus*, and *C. hamulosus* show glumes that are deciduous before the rhachilla (e. g., *Palmer* 417, from San Pedro Martin Island, Gulf of California, and Torrey's specimen from Yosemite Valley, California, Aug. and Sept. 1872,

both in the herbarium of the Acad. Nat. Sci. Phila., show numerous persistent rhachillas from which the glumes have fallen) but the rhachillas themselves are also readily deciduous (naturally or artificially), leaving a smooth knob persistent on the rhachis, while the bracteoles and prophylla behave as in *C. compressus*.

It seems, therefore, that the weightier and more decisive reasons place *C. aristatus* and its allies in *Eucyperus* as a section but neither in sections *Amabiles* nor *Compressi*.

STATUS OF *CYPERUS INFLEXUS* MUHL.

This species was described by Muhlenberg [Descr. 1817] in terms that do not distinguish it in any particular from *Cyperus aristatus*. He does say "C. squarroso et aristato affinis and C. conferto proximus, Swartz 5." In Muhlenberg's collection at the Philadelphia Academy of Science, folder #44 contains his collection of *Cyperus* (sheets #26 to #49 inclusive). Sheet #27 (collector's #5) is labelled "C. suaveolens compresso prox." without any mention of *C. inflexus* anywhere on the sheet or on the folder. In addition to some ten plants of what has been passing as *C. inflexus* Muhl. there are two dwarf specimens of *C. erythrorhizos* Muhl. Sheet #34 of this same folio (collector's numbers 452 and 474) is *C. erythrorhizos* and was so named by the author. It certainly seems curious that he used his name for *C. erythrorhizos*, but never used *C. inflexus*. This may indicate Muhlenberg himself had misgivings about his *C. inflexus*. The ten plants of *C. aristatus* in Muhlenberg's collection have culms 5–7 cm. tall, spikelets 8–10 mm. long, the body of the glumes 1–1.2 mm. long, almost always 9-nerved. On one mature head 5 or 6 basal glumes are missing on each of the rhachillas which were all still persistent on the rhachis. Many of the pale immature achenes and solitary stamens are persistent on the rhachilla although the glumes have fallen. About 20 to 30 spikelets form a head. The achenes are obovoid-oblong, none of them mature. Although these specimens are a century old, they are still distinctly aromatic. This plant is exactly the same as material collected in Virginia and Pennsylvania today.

This plant has been treated as synonymous with *Cyperus aristatus* Rottb. by Robinson & Fernald [Gray, Man. ed. 7, 175 (1908)] and by Britton [Bull. Torr. Club 13: 207 (1886)] but by Boeckeler

[Linnaea 35: 500 (1868)] as a form of *C. aristatus*. Later Britton considered it a distinct species [Ill. Fl. N. E. States 1: 300, ed. 2 (1913) and Abrams' Ill. Fl. Pacific States 1: 227 (1933)]. Kükenthal [Pflanzenreich 4²⁰: 504 (1936)] treated it as a variety of *Cyperus aristatus*. Apparently, Britton nowhere published the means he used to distinguish *C. aristatus* from *C. inflexus*, whereas Kükenthal gives differences which may be summed up in the following table and key:

	Height of plant	No. of rays	Diam. of spikes	Color of glumes	Size of achene
<i>C. aristatus</i>	2-20 cm.	2-5	8-10	"rufae vel ferrugineae vel stramineae" "saepius pallescentes"	$\frac{1}{3}$ - $\frac{1}{2}$ glume
var. <i>inflexus</i>	"plerumque humilis"	1-3	4-6		$\frac{1}{2}$ - $\frac{2}{3}$ glume

KEY BASED ON THE ABOVE CHARACTERS

Spikes 8-10 mm. diam. achene $\frac{1}{3}$ - $\frac{1}{2}$ length of glume; glumes brown, red or yellow; plant 2-20 cm. tall; rays 2-5. *C. aristatus* Rottb.
 Spikes 4-6 mm. diam. achene $\frac{1}{2}$ - $\frac{2}{3}$ glume; glumes often pale in color; plant very low; rays 1-3. var. *inflexus* (Muhl.) Kükenth.

With all authors *C. inflexus* is considered to be confined to the American continent. On the other hand, *C. aristatus* is found in the Old World and according to Kükenthal in Yucatan in the New World.

The following table shows measurements, etc. of important features that have been used to differentiate *C. inflexus* from *C. aristatus*:

	Height of culm (cm.)	No. of rays	Diam. of spikes (cm.)	Color of glumes	Length of body of glume (mm.)	Length of mucro (mm.)	Length of entire glume (mm.)
Stewart 9464, Kashmir, N. W. Himalaya	2.5-3.0	0-2	0.5-1.2	straw-colored	1.5	0.5-0.7	2.0-2.2
Koelz 3064, Punjab	1.5-2.0	0-1	0.8-1.0	pale straw-colored	1.5	0.5-1.0	2.0-2.5
Wight 1819, India	3.0-5.0	0-4	0.5	brown	1.0	0.5-1.0	1.5
Delavay 1760, China	2.0-2.5	0-4	0.4-0.8	brown	1.2-1.5	0.5-0.8	2.0

	Height of culm (cm.)	No. of rays	Diam. of spikes (cm.)	Color of glumes	Length of body of glume (mm.)	Length of mucro (mm.)	Length of entire glume (mm.)
<i>Curtis</i> 536, British East Africa	5-10	3-4	0.5-0.9	straw- colored and red- dish brown on the same culm	1.0-1.3	0.8-1.0	1.8-2.0
<i>Leprieur</i> , Senegal, Africa, in 1924	6.5-10	3-4	0.6-1.0	reddish- brown	1.0-1.5	0.6-1.0	1.5-2.0
<i>Schlagintweit</i> 6136, Tibet	2.5-5	2-4	0.3-0.4	straw- colored	1.2-1.5	0.5-1.0	2.0-2.5
<i>Schlagintweit</i> 3626 Tsamba, Western Himalaya	3.5-6	5	0.3-0.8	straw- colored	1.5-2.0	0.5-1.0	2.0-3.0
<i>T. Thompson</i> , N. W. Himalaya	1.5-6	3-4	0.7-0.8	straw- colored	1.5-1.8	0.5-1.0	2.5-2.8
<i>J. D. Hooker</i> , East India	0.7-2	3	0.5-0.7	reddish- brown	1.2-1.5	0.5-1.0	1.8-2.0
<i>Kotschy</i> 50, Nubia, Africa	5.0-11	4-6	0.6-1.0	light brown	1.0-1.5	0.8	1.5-2.0
<i>Roper</i> , Senegal, Africa	8.0-13	3	0.5-0.6	brown	1.0-1.2	0.8-1.0	1.5-2.0
* <i>Koelz</i> 3593, Kashmir, N. W. Himalaya	0.5-1.0	0	Only 1 spikelet at the summit of culm, 2.5-3.0 mm. wide	pale straw- colored	1.5-2.0	0.5-1.0	2.0-3.0
* <i>G. King</i> 1869, Dehra Dun	1.0-3.5	0	Only 1-2 spikelets at the summit of culm, 1.5 mm. wide	reddish or purplish brown	1.0-1.5	1.0	1.5-2.0
** <i>Lawrence</i> , India	2.0-5.0	0	0.8-1.2	reddish- brown	2.0-2.5	1.0-2.0	4.0-4.5
** <i>Ward</i> , India	1.5	0	0.8	reddish- brown	1.2-1.5	1.2-1.5	2.5-3.0
** <i>Wight</i> , 1820, India (type or isotype)	3-4	0	1-1.5	reddish- brown	1.8-2.0	1.5-2.0	3.2-3.5
** <i>Wallich</i> 3374, ex herb. Wight (cotype)	3.0	0	0.9	reddish- brown	1.5	1.0-1.5	2.5-3.0
<i>Plantae Exsiccatae</i> <i>Grayanae</i> 130	1-2	0-3	0.7-0.8	reddish- brown	1.4-1.6	1.0-1.2	2.2-2.5
<i>Hapeman</i> , Aug. 3, 1920, Minden, Nebraska	5-10	0-5	0.7-1.3	straw- colored	1.5-1.8	1.0-1.5	2.5-3.0

* *C. aristatus* f. *alpinus* C. B. Clarke** *C. aristatus* var. *versicolor* (Nees) Kükenth.

	Height of culm (cm.)	No. of rays	Diam. of spikes (cm.)	Color of glumes	Length of body of glume (mm.)	Length of mucro (mm.)	Length of entire glume (mm.)
<i>Gaumer</i> 1023, Yucatan	7-12	0-5	1.0-2.0	dark brown	1.5-2.0	1.0-1.5	2.5-3.0
<i>De Wailly</i> 4686, Africa	4-7.5	0-4	0.5-0.9	straw- colored	1.2-1.3	1.0	2.0-2.2
<i>Rottboell's</i> type speci- men (photograph)	5.5-7.5	0-3	0.3-0.5		0.8	0.5-1.0	1.3-1.5

From the above table it is evident that:

(1) The distinction as to height of culm cannot be used to separate Old World from New World material. *Tweedy* 4859, Colorado, has culms 1.5-5.0 cm. tall; *Copeland* 612, California, has culms 0.5-1.0 cm. tall bearing 1 or 2 spikelets. These are very much like C. B. Clarke's forma *alpinus*. Considered by themselves they seem very distinct, but studied in connection with 600 sheets it is readily seen that they are merely depauperate forms connected by a large number of intergrading plants from every part of the United States.

(2) Number of rays is equally useless as a distinction, e. g., *Bartlett* 966, Georgia, has 1-5 rays; *Hapeman*, Nebraska, 1-5 rays, etc.

(3) Although Kükenthal gives spikes 8-10 mm. in diameter for *C. aristatus* and 4-6 mm. for *C. inflexus*, specimens from the southern states, Georgia to California, frequently show spikes 15-30 mm. across, while Old World specimens often have spikes 4-6 mm. in diameter.

(4) As to the color being rufous or ferruginous, this color is about equally common in both Old and New World specimens, and, apparently, is the result of the kind and amount of sunlight which the plant receives. (*Curtis* 536, British East Africa, shows glumes straw-colored and reddish-brown on the same culm.)

(5) As regards the length of glume contrasted with length of achene, the ratio is found to be about the same in both Old and New World material, thus in Old World specimens it varies from 1.9-3.6 and in those from the New World 2.2-3.6. *McVaugh* 4497, Columbiaville, N. Y., has achenes nearly or quite as long as the body of the glume, although some of the achenes are only $\frac{2}{3}$ as long as the body of the glume. On the other hand, Sheldon's

specimen from Minnesota, Chapman's from Florida and Hale's from Louisiana show achenes $\frac{1}{2}$ to $\frac{1}{3}$ as long as the glume. *J. & T. Howell*, Oregon, Columbia River, shows achenes $\frac{1}{3}$ to $\frac{2}{3}$ as long as the glumes. *Reverchon* 3591, Texas, has achenes $\frac{1}{2}$ as long. From these specimens selected at random from widely scattered points in the United States as well as from the table, it is quite evident that distinctions based on relative length of achene and length of glume show as wide a variation in American as in Oriental material.

From these facts it seems evident that there is no distinction at all between *C. inflexus* and *C. aristatus* and that it is, apparently, something of a weed in tropical and warm-temperate regions everywhere.

C. versicolor Nees, based on *Wight* 1820, Madras, India, has been reduced by Boeckeler to a variety of *C. aristatus*. This variety is clearly separable by means of the characters listed by Kükenthal (*Das Pflanzenreich* 4²⁰: 504. 1936).

Apparently, Kükenthal very rightly reduced *C. falciculosus* Liebm. to a form of *C. aristatus*. Purpus 6345 seems best treated as this form.

In 1899, F. Cavara published *C. aristatus* var. *Boeckeleri* [*Atti Ist. Bot. Univ. Pavia* 5²: 23–28 (1899)] which Kükenthal puts in the synonymy under *C. aristatus* var. *inflexus* [*Pflanzenreich* 4²⁰: 502. (1936)]. The accurately drawn plate showing life-size drawings of four different plants which Cavara comprises within his new variety can all be readily matched by plants from the United States or the Orient. Cavara gives as segregating characters:

Ochreis purpureo-violaceis, squamis subdecurrentibus, caryopside squamae medium superante, mellea, sub-translucida, stilo exserto, racheola anguloso-contorta.—Omnino gracilior.

Two pages previous to this, Cavara quotes a letter from Boeckeler regarding the variety he had named in his honor:

. . . Ich habe unsere Pflanze mit einem grossen aus verschiedenen Gegenden und Localitäten stammenden Material des *Cyp. aristatus* vergleichen können, und dabei die ausgezeichnete Beschaffenheit namentlich der Blätter u. Bracteen immer völlig constant gefunden. Gleichvoll kann ich sie nur für eine sehr ausgezeichnete Varietät des *Cyperus* nehmen.

Curiously, Boeckeler differentiates the variety on leaf and bract

characters, while Cavara refers to other and entirely different ones. Taking the characters proposed by the latter one by one: "ochreis purpureo violaceis" are colors frequently shown on material from any part of the world; "squamis decurrentibus" is hardly accurate, because the glumes are not prolonged and decurrent. Morphologically, the edge of the rhachilla is produced as a cartilaginous margin, not at all continuous with the base of the glume; the other characters he mentions, such as the length and color of the achene, are likewise shown by specimens selected at random from any part of the United States. The rhachillas in this species are all more or less zig-zag. Cavara, further, states that *C. aristatus* is a plant of the tropical regions, saying that it extends to Cuba and Mexico (Orizaba), oblivious to the fact that the same plant found at Orizaba extends as far north as New Brunswick and Vancouver Island. Boeckeler's differentiation is of even less value than Cavara's.

It seems best, therefore, to treat our American material as *C. aristatus* with the following synonymy:

C. ARISTATUS Rottb. Descr. et Icon. 23, t. 6, fig. 1. 1773. *C. uncinatus* R. Br. Prodr. 215. 1810; non Poir. *C. Brownei* R. & S. Syst. 2: 228. 1817. *C. inflexus* Muhl. Descr. 16. 1817. *C. Purshii* R. & S. Syst. 2: 177. 1817. *C. pygmaeus* Nutt. Trans. Am. Phil. Soc. 5: 142. 1837; non Rottb. *C. falciculosus* Liebm. Vidensk. Selsk. Skr. 5²: 204. 1851. *C. aristatus* forma *inflexus* Boeckl. Linnaea 35: 500. 1868. *C. aristatus* var. *Boeckeleri* Cavara, Atti Ist. Bot. Univ. Pavia 5²: 26. 1899. *C. aristatus* var. *inflexus* Kükenth. in Engler, Das Pflanzenreich 4²⁰²: 504. 1936. *C. aristatus* var. *inflexus* f. *falciculosus* Kükenth. in Engler, Das Pflanzenreich 4²⁰²: 505. 1936. *Chlorocyperus inflexus* Palla in allg. Bot. Zeitschr. 17. Beih. 6. 1911. *Dichostylis aristata* Palla in Engler, Bot. Jahrb. 10: 286. 1888. *Isolepis echinulata* Kunth, Enum. Pl. 2: 205. 1837. *Scirpus intricatus* L. Mant. 2: 182. 1771. *S. lappaceus* Lam. Ill. 1: 139. 1791 (ex descriptione).

In treating *C. aristatus* the following additional variety is to be noted:

C. ARISTATUS Rottb. **Runyoni** O'Neill, var. nov. Achenium lineari-spatulatum, 0.2 mm. latum, apice autem abrupte turgidum quasi-umbonatum 0.3 mm. latum; planta robusta. Caeterum sicut species.

This variety differs from the species in the shape of the achene which is linear-spatulate, 0.2 mm. wide throughout except at the abruptly widened, sub-umbonate apex which is 0.3 mm. wide.

The variety is a very robust plant as can be seen from the following description:

Leaves 1.5–2.0 mm. wide; bracts 1–5 mm. wide; rays 0–3, 0–4 cm. long, the peduncles 0–3 cm. long; spikelets 5–15 mm. long, 1.5 mm. wide, narrowly linear, 15–25-flowered; rhachilla 0.5 mm. wide, 0.2 mm. thick; glumes 2.2–2.8 mm. long, of which the awn is 1.0 mm., the body 1.3–1.8 mm. long, 0.6–0.7 mm. wide, oblong-lanceolate, scarcely, if at all, imbricate; achene 0.8–1.0 mm. long, 0.2 mm. wide throughout except at the abruptly widened, tri-umbonate, apiculate apex which is 0.3 mm. wide, linear-spatulate, grayish-brown (i. e., brown with a frost-like coat), iridescent, substipitate, minutely depressed-puncticulate.

TEXAS: Kenedy Co., *Runyon* #1933 (TYPE); *Runyon* 2655 Los Norias. *Buckley*, Valley of the Rio Grande, in 1879–1883 in New York Botanical Garden, but not Buckley's specimen in the Philadelphia Academy of Science. MEXICO: State of Coahuila, Monclava, *Palmer* 1330. (U. S. Nat'l Herb.). Isotype specimens will be distributed to the Gray Herbarium, U. S. National Museum and forty other institutions.

CYPERUS BUSHII BRITTON

C. Bushii is here considered synonymous with *C. filiculmis*. Britton's type specimen, *Bush* 619 from Arkansas (in the New York Botanical Garden), agrees perfectly in all respects with specimens of typical *C. filiculmis* found in the Eastern States as already pointed out by Fernald & Griscom [*RHODORA* 37: 153: 1935]. A specimen of Commons collected at Rehoboth, Delaware, August, 1895, is a perfect match of the type. Furthermore, it was found that material from Pennsylvania, Maryland, Virginia and other eastern states could be readily duplicated by the western variants of the species.

A careful examination of other specimens in the New York Botanical Garden which Britton had annotated *C. Bushii* indicates that his idea of that species included the mid-western plant, × *C. mesochorus* Geise (considered in this revision as a form of *C. Schweinitzii* with more densely congested spikes) and many western forms of typical *C. Schweinitzii* (e. g., the plant collected by Capt. Marcy in Oklahoma in 1852 which has rough culms, spikelets all ascending and glumes with conspicuous mucros, 0.3 to 0.5 mm. long).

It may be noted that western forms of *C. filiculmis* and *C. Schweinitzii* intergrade so closely that new names for these

intermediate plants accomplishes nothing except increased difficulty in setting limits to these two species. The following may be cited as examples of intermediate forms: *Rydberg* 2362 from Meadow Park, Colorado, which shows the inflorescence of *C. filiculmis* but the achenes and mucronate glumes of *C. Schweinitzii*, and *Gayle* 622, Ft. Riley, Kansas, which has the glumes of *C. filiculmis* but the inflorescence of *C. Schweinitzii*.

× CYPERUS MESOCHORUS GEISE AND *C. HOUGHTONII* VAR.
UBERIOR KÜKENTHAL.

× *C. mesochorus* is treated here as a form of *C. Schweinitzii* with denser heads containing more numerous and more digitately-disposed spikelets in contrast to the more pinnately-arranged spikelets found in typical plants. Although Sister M. Joseph Geise regarded it as a hybrid between *C. Schweinitzii* and *C. Houghtonii*, an examination of several hundred sheets of related species seems to indicate that the plant occupies an intermediate position not so much between *C. Houghtonii* and *C. Schweinitzii* as between *C. filiculmis* and *C. Schweinitzii*.

C. Houghtonii var. *uberior* is evidently identical with × *C. mesochorus*. As representative of his variety Kükenthal cites the following: "Indiana: Dunes (U m b a c h !). Texas: Weatherford (T r a c y n. 7966!)." *Umbach* 1229, Dune Park, Indiana, was the only specimen seen among many collected by that botanist, which could be construed as var. *uberior* and in all probability is the specimen alluded to by Kükenthal. It has been annotated by Sister Mary Joseph Geise as *C. mesochorus*. The specimen is very likely the isotype of Kükenthal's variety and cotype of Geise's hybrid-species. Tracy's specimen matches in all details *Deam* 18168 and others from Indiana which have been annotated by Sister Mary Joseph Geise as × *C. mesochorus*.

CYPERUS SUBAMBIGUUS KÜKENTHAL.

Plants intermediate between typical *C. subambiguus* and typical *C. flavus* occur so very commonly, that the two species are considered synonymous in this study. Moreover, several sheets of *Blumer* 1636, from Arizona, isotypes of *C. subambiguus* var. *pallidicolor*, match a specimen of *C. flavus* from Uruguay collected by Arechavaleta as to size and shape of achene, length of

glumes and other characters. The only evident difference is the slightly less dense spikes in the Arizona specimens. *Yuncker* 5632 from Spanish Honduras seems intermediate between West Indian *C. flavus* and the Arizona material. *Ragonese* 184 from Argentine matches the Arizona specimens in every respect.

CYPERUS UNIFLORUS T. AND H. (= *C. SUBUNIFLORUS* BRITTON)

C. uniflorus and *C. strigosus* are sometimes confused. The following key serves to distinguish these species in the mature state:

- Glumes conspicuously clasping the achene, distant, *i. e.*, the apex of one glume barely reaching the base of the glume next above on the same side of the rhachilla, commonly reddish; the nerves aggregated close to the keel, spikelets subquad-rangular, 0.7 to 1 mm. wide, 1- to 5-flowered; rhachilla conspicuously curved about each achene, the wings 2 to 2.7 mm. long, 0.5 to 0.7 mm. wide, thickened over the angles of the achene; achene 2.2 to 2.5 mm. long, 0.6 to 1 mm. wide. *C. uniflorus*.
- Glumes spreading, imbricate, *i. e.*, the lower overlapping the next above on the same side of the rhachilla about half its length, commonly yellowish or golden brown; the nerves evenly distributed, spikelets compressed or subcompressed, 1 to 1.5 mm. wide, 4- to 20-flowered; rhachilla straight or slightly zigzag, the wings 1.5 to 2 mm. long, 0.3 to 0.5 mm. wide, thin, hyaline; achene 1.5 to 2 mm. (sometimes 2.2 mm. in var. *stenolepis*) long, 0.5 to 0.6 mm. wide. *C. strigosus*.

C. subuniflorus Britton is here included under *C. uniflorus* since it is impossible to draw any kind of a dividing line between the two entities when a large number of specimens are studied. Both species appear to stand at opposite ends of a long series of intergrading forms. The following specimens picked at random from several hundred sheets are such intermediate forms: *Reverchon* 999, *Hall* 686, *Clemens* 411, *Neally* 214, *Cory* 16517, *Purpus* 8294, *Ruth* 770 and 893, *Runyon* 1924 and 1932. Britton's species, published in *Small's Flora of the Southeastern United States* (ed I. 173. 1903), is based upon *C. uniformis* (obvious lapse for *uniflorus*) var. *pumilus* Britton, previously published as a *nomen nudum* (*Bull. Torr. Club* **13**: 215. 1886). *Palmer* 350 from Indian Territory and *Buckley's* specimen from the valley of the Lower Rio Grande (1879-1883) are respectively the type and cotype of that variety. Since Britton later raised that variety to specific rank as *C. subuniflorus*, these two specimens automatically become type and cotype of that species.

C. subuniflorus has been confused with *C. globulosus*. The differences are shown in the following key:

- Achene 0.6 to 1 mm. wide, 2 to 2.5 mm. long; wings of the rhachilla thickened over the angles of the achene; nerves of the glumes aggregated close to the keel; spikelets 1- to 5-flowered; leaves 1 to 2 mm. wide; bracts 3 to 5.....*C. subuniflorus*.
 Achene 0.5 to 0.6 mm. wide, 1.3 to 2 (usually 1.5) mm. long; wings of the rhachilla thin, hyaline; nerves of the glumes evenly distributed; spikelets 3- to 12- (rarely 25-) flowered; leaves 3 to 7 mm. wide; bracts 5 to 11.....*C. globulosus*.

Specimens cited by Kükenthal as *C. uniflorus* var. *floribundus* are examples of typical *C. uniflorus* with 1 to 3 extra achenes. The long recurved mucro mentioned as characteristic of this variety is found also on the type specimen of the species itself (*Drummond* 287 in the Torrey Herbarium of the New York Botanical Garden) in just as high a degree of development.

C. retroflexus as shown by the type specimen (*Buckley*, "northern Texas" in the Philadelphia Academy of Natural Sciences) is only a robust form of *C. uniflorus*. On the sheet in Britton's handwriting is "very large form or variety" (i. e., of *C. uniflorus*). Kükenthal reduces the plant to a variety of *C. uniflorus*, but since it has no characters which set it definitely apart from the species it is here placed in synonymy. The monographer mentions "spiculae demum reflexae teretes" as distinguishing feature. The spikelets on all *C. uniflorus* are more or less reflexed. Plank's specimens from Marfa and Burnett, Texas, *Sister M. Clare Metz* 294, *Reverchon* 3426 and Wright's plant from Texas all show reflexed spikelets in varying degrees. They are subquadrangular rather than terete. These same plants also show variable heights of culm, hence that feature must also be ruled out as a means of separating the variety from the species.

Of doubtful status is *C. uniflorus* var. *pseudothyrsiflorus* Kükenth. (= *Mariscus dissitiflorus* C. B. Clarke). Type specimen (*Pringle* 1966 from Nuevo Leon, Mexico) and closely similar Texan specimens, e. g., *Buckley's* from the Lower Rio Grande, *Tharp's* from Austin, *Cory* 15582 and 27390, *Hughes* 167 and *Wright's*, sine loc., all have 3 to 14 achenes in a spikelet. These plants may possibly be hybrids of *C. uniflorus* and *C. setigerus* T. et H.

CYPERUS FENDLERIANUS VAR. LEUCOLEPIS (BOECK.) KÜKENTH.

C. Fendlerianus var. *leucolepis* seems best regarded as synonymous with the species. The distinguishing varietal characters offered by Kükenthal are: "anthela unispicata 14 mm. longa oblonga-conica, spiculae parvae 3-4-florae patentissimae vel deflexae, squamae albescentes obsoletius nervosae purpureo-variegatae." One or more of these characters are not uncommon in typical specimens of *C. Fendlerianus*; plants with only 1 spike often have spikelets bearing 5 to 8 achenes, and plants with 3 or 4 spikes frequently show spikelets with 3 or 4 achenes. The color and nervation of glumes mentioned for the variety are the same as found in some otherwise typical specimens. Color of glumes is a variable, a superficial character not only in this species but throughout the genus. Certainly, it cannot be used to differentiate this variety.

The following table lists the features used by Kükenthal in setting apart his var. *major* from typical *C. Fendlerianus*:

	Culms	Width of leaves	Diameter of Inflorescence	Spikes
<i>C. Fendlerianus</i> var. <i>major</i>	"gracilis" "robustus"	2-4 mm. "lata"	————— "ad 4 cm."	"1 cm. longae" "longiores crassiores"

Only three specimens of *C. Fendlerianus* among the many studied could possibly be considered the variety. Results of a careful examination of these plants particularly in regard to those characters mentioned above are tabulated:

	Culms	Width of leaves	diameter of inflorescence	Spikes
Bros. Arsène & Benedict 16195 (cotype)	1.5 mm. throughout	2 to 3 mm.	1.5-2.5 cm.	1 cm. wide, 2 to 3.5 cm. long
Wynd & Mueller 580	1 mm. at apex 2 mm. at base	3 mm.	1.5-3 cm.	"
Shreve 9157	1 mm. at apex	4 mm.	2-4 cm.	"

It is evident that the dimensions are such as to warrant placing the plants either with the species or the variety. The terminal spikes (20 to 35 mm. long) are somewhat longer than they are in typical specimens (10 to 20 mm.), but this character alone does not appear sufficient for maintaining the variety. Accordingly,

var. *major* is regarded in this study as merely a large form of the species.

C. sphaerolepis is placed by Kükenthal in the synonymy of *C. Fendlerianus* var. *debilis* yet the characters given by Boeckeler in his original description, namely, "umbel subtri-radiate; rays 0.6 to 1.8 cm. long; spikelets 2 to 6 mm. long, 4- to 8-flowered," are those of *C. Fendlerianus typicus* and not of var. *debilis*.

C. Rusbyi does not seem sufficiently distinct from *C. Fendlerianus*, since many intermediate plants are commonly found between the two species. In fact, such specimens as Standley's collection from the Organ Mountains, New Mexico (U. S. Nat. Herb. 560818), show what may be taken as the two species in the same tuft. It, therefore, seems best to retain this plant under the varietal name, *C. Fendlerianus* var. *debilis*. Although plants intermediate between the variety and the species itself are occasionally found, it is possible in most cases to separate the two.

CYPERUS PLANKII BRITTON

C. Plankii (= *C. ovularis* var. *robustus* Boeckl. and *C. retrorsus* var. *robustus* Kükenth.) is a robust plant of Texas and represents an extreme form of either *C. globulosus* or *C. retrorsus*. From a study of an excellent set of intergrading forms recently collected by Robert Runyon of Brownsville, Texas, it seems somewhat more appropriate to place it under *C. globulosus*. The number of florets in the spikelet, the color and texture of the glumes, in fact, the entire spikelet is precisely the same as in *C. globulosus*. The achene fluctuates in width between that of *C. globulosus* and *C. retrorsus*. Although the dense spikes, sometimes elongated, suggest the general appearance of *C. retrorsus*, a better series of connecting forms exists between *C. globulosus* and *C. Plankii* than between the latter and *C. retrorsus*. Fisher's specimen from Houston, Tharp's from Austin and Runyon's specimens 1926B, 2124 and 1926 show this clearly. The last specimen mentioned has 7- to 11-flowered spikelets exactly identical with typical *C. globulosus* spikelets.

C. globulosus and *C. retrorsus* themselves are very similar and intermediate forms between the two occur. The most satisfactory separation seems to be made according to the following key:

- Mature spikelets 3- to 8-flowered, commonly yellowish, occasionally purplish brown; achenes commonly 2½ times as long as wide.....*C. globulosus*.
 Mature spikelets 1- to 3-flowered, purplish brown; achenes 3 times as long as wide.....*C. retrorsus*.

It does not seem to mend matters by inserting a third ill-defined group (*C. Plankii*) between two already ill-defined and intergrading species. Accordingly, *C. Plankii* is here placed with *C. globulosus* and considered the form of that species in the xerophytic region of Texas.

C. globulosus var. *pseudofiliculis* is described by Kükenthal as: "Humilis 3-10 cm. altus. Spicae 1-4 saepe sessiles agglomeratae vel laterales breviter pedunculatae." A specimen collected by Ruth in 1894 in Knoxville, Tennessee, and one collected by Davis in South Carolina were the only plants out of approximately 200 sheets of *C. globulosus* which could possibly be considered that variety. Ruth's specimen has mature plants with culms 5 to 8 cm. tall. Both specimens show 2 to 4 spikes but since specimens otherwise typical sometimes have 2 to 4 spikes, that feature cannot be considered diagnostic. Sessile spikes are not distinctive; they occur commonly in many tall specimens. In view of these facts, this variety is not maintained here.

In 1888 Britton published a variety *multiflorus* under *C. echinatus* (Ell.) Wood. In so doing, he transferred Chapman's unpublished variety of the same name from *C. Baldwinii* to *C. echinatus*. Kükenthal and Ekman, evidently, were not aware of Britton's variety, since they published a "new" variety *multiflorus* under *C. globulosus* Aubl. in 1929. Inasmuch as these plants, both Britton's and Kükenthal's, differ in no essential respect from typical *C. globulosus* except that the spikelets have 8 to 12 or rarely even as many as 25 achenes (in the typical material there are 3 to 8), they are included in the synonymy of the species.

CYPERUS NASHII BRITTON

C. Nashii, commonly considered a variety of *C. retrorsus*, seems best regarded as a distinct species on account of the differences shown in the following key:

- Achene 3 to 4 times as long as wide, 1.5 mm. long, 0.4 to 0.5 mm. wide; glumes 2 to 2.5 mm. long, 1.2 to 1.5 mm. wide, conspicuously nerved, dull, the margins more or less involute, not meeting at the rachilla.....*C. retrorsus*.

Achene 2 to 3 times as long as wide, 2 mm. long, 0.7 to 1 mm. wide; glumes 2.2 to 3 mm. long, 1.8 to 2 mm. wide, obsolete, nerved, lustrous, the margins tightly involute and frequently meeting or even overlapping at the rhachilla.....*C. Nashii*.

Below are some typical examples of *C. Nashii*:

TYPE SPECIMENS: *Nash* 1196, Eustis, Lake Co., FLORIDA, August 16-25, 1884, in the New York Botanical Garden. Photograph in the Langlois Herbarium. FLORIDA: *Britton and Wilson* 28; *Correll* 5846; *Correll and McFarlin* 6228; *Chapman*, Apalachicola in 1889; *Cuthbert*, Bradentown; 1613; *Hitchcock*, Eustis; *Nash* 1195, 1196 (type); *O'Neill* 5094, 5095, 7241, 7242, 7244; *Pieters* 45; *Small and DeWinkler* 9986; *Small, Small and DeWinkler* 10640; *Small and West*, Avon Park; *West*, Lake Worth, Palm Beach County; *West and Arnold*, Gilchrist County; *Tracy* 6316. GEORGIA: *Eyles* 6496.

(To be continued)

NOTES ON SOME FRESH-WATER ALGAE FROM NEW ENGLAND¹

A. H. GUSTAFSON

STUDIES on the New England fresh-water algae have extended over a considerable period of time, have been carried on by a large number of well-known algologists both native and foreign, and have been published in an extensive series of papers but our knowledge of even such problems as their occurrence and distribution is fragmentary. The first record of a specific alga together with its place of collection appears to be that of Eaton (6) in 1817. An appendix to Bailey contributed by Cole (3) lists certain species from Salem, Massachusetts and Olney (11) published early Rhode Island records. Since the middle of the last century more than 150 papers containing data on the New England fresh-water species have appeared. A list of the authors of these papers includes a large proportion of the better-known American students as well as a number of representative European scholars. Data on the Maine species has been supplied for the most part by Harvey (7, 8, 9) and West (15, 16) and is far from complete. New Hampshire has been a fertile collecting ground especially for students of the desmids and a considerable

¹ It is a pleasure to acknowledge financial assistance from the Williams College 1900 Fund in carrying on this study.